INCH-POUND

MIL-PRF-1/1485E
16 July 1999
SUPERSEDING
MIL-E-1/1485D
17 January 1980

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON
TYPE 7665 AND 7665A

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Hydrogen, ceramic-metal.
See figures 1 and 1A.
Mounting position: Any.
Weight: 10 ounces nominal.

ABSOLUTE RATINGS:

Parameter:	Ef	epy	epx	Ebb	egy	egx	ib	Ecc	Ip	Ib
Unit:	V ac	kv	kv	V dc	v	v	a	V dc	A ac	A dc
Maximum:	6.8	16.0 1/	16.0 2/	---	600 3/	200	350	150	6.5	0.50
Minimum:	5.8	2.0	5% epy	1,000	200	---	---	---	---	---
Test conditions:	6.3	16.0	---	---	150	---	---	0	---	---

ABSOLUTE RATINGS:

Parameter:	prr	Eres	Pb	tk	dik/dt	TA	tj	Cooling
Unit:	pps	V ac	---	sec	a/µs	°C	µs 7/	5/
Maximum:	4/	6.8	5.0×10^{9} 4/	---	2,000	+150	0.005	---
Minimum:	---	5.8	---	180	---	-55	---	---
Test conditions:	1,000	6.3 6/	---	180	---	---	---	---

See footnotes at end of table I.

GENERAL:
Qualification - Required

TABLE I. Testing and inspection.

Inspection	Method	Condition	Acceptance level	Inspection level or code	Symbol	Limits		Unit
						Min	Max	
Conformance inspection, part 1								
Instantaneous starting	3267	epy = 16 kv (min); 10/ Ef = Eres = 6.8 V	0.65	II	---	---	---	---
Operation (1)	3246	epy = 18 kv; 9/ Ef = Eres = 5.8 V; t = 10 minutes	0.65	II	egy	---	150	v
DC anode voltage for conduction	3247	Ef = Eres = 5.8 V	0.65	II	Ebb	---	1000	V dc
Heater current (cathode)	3241		0.65	II	If	3.5	8.0	A ac
Heater current (reservoir)	3241		0.65	II	Ires	1.0	4.0	A ac
Pulse emission (method A)	3251	ik = 350 a; tp = 5.0 µs ± 10%; prr = 60 ± 10%; tr = 0.5 µs (max); starting time of pulse = 2.5 µs; specified time interval = 4.0 µs	0.65	II	egk	---	200	v
Conformance inspection, part 2								
Operation (1A)	3246	Operation (1); t = 10 minutes tk = 5 minutes Ef = Eres = 6.8 V	---	---	egy	---	150	V
Anode delay time	3256	Operation (1); t = 120 seconds	---	---	tad	---	0.4	µs
Anode delay time drift	3256	Anode delay time 11/	---	---	Δtad	---	0.10	µs
Time jitter	3261	Operation (1), 9/ 12/ except epy = 8 kv	---	---	tj	---	0.005	µs
Operation (2)	3246	prr = 300; 13/ epy = 6.6 kv; t = 20 minutes; Ef = Eres = 5.8 V	---	---	egy	---	150	v
Conformance inspection, part 3								
Life test(1)	---	Group C; t = 96 hours “on” and 1 hour “off” (tube mounted horizontally); t = 500 hours 9/	---	---	---	---	---	---

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method	Condition	Acceptance level	Inspection level or code	Symbol	Limits		Unit
						Min	Max	
Conformance inspection, part 3 - Continued								
Life-test (1) end points:								
Operation (1) and (1A)	3246		---	---	egy	---	150	v
DC anode voltage for conduction	3247	egy = 150 v	---	---	Ebb	---	1000	V dc
Time jitter	3261	egy = 150 v	---	---	tj	---	0.005	µs
Shock	1041	100 G at 11 ms; no voltage applied 15/	---	---	---	---	---	---
Variable-frequency vibration	1031	No voltage applied 8/ 15/	---	---	---	---	---	---
Shock and variable-frequency vibration end points:								
Operation (1)	3246	15/	---	---	egy	---	160	v
Time jitter	3261	15/	---	---	tj	---	0.005	µs
Operation at elevated ambient temperature	3246	TA = 150°C; 9/ 14/ t = 5 hours	---	---	egy	---	150	v
Life test (2)	---	epy = 6.0 kv; 15/ prr = 300; t = 500 hours	---	---	---	---	---	---
Life-test (2) end points:								
Operation (2)	3246		---	---	egy	---	160	v
DC anode voltage for conduction	3247	egy = 160 v	---	---	Ebb	---	1000	V dc

See footnotes at end of table.

TABLE I. Testing and inspection - continued.

1/ Instantaneous starting is permissible. The maximum permissible epy is 16 kv and shall not be attained in less than 0.04 second.

2/ In pulsed operation, the peak inverse voltage, exclusive of a spike of 0.05 μs (maximum) duration, shall not exceed 5.0 kv during the first 25 μs following the pulse.

3/ The driver pulse, measured at the tube socket with the thyratron grid disconnected: 200 volts minimum, 600 volts maximum; tr = 0.35 maximum; grid pulse duration 2.0 μs minimum. Impedance of drive circuit: 50 to 500 ohms. At -55°C, a minimum of 250 volts is required.

4/ The tube is capable of operation at more than 50,000 pps within the limitations of the Pb factor and the Ib current ratings. With a saturable reactor, Pb equal to 7×10^9 is permissible for certain applications.

5/ It may be desirable to employ forced-air cooling under conditions of high Pb number operations. A cooling air-blast of 5 cfm may be directed into the anode cup.

6/ The optimum reservoir voltage for operation in accordance with operation (1) conditions is 6.3 V ac and shall be held within ± 7 1/2 percent. Applications involving other operating conditions may necessitate the redetermination of the optimum reservoir voltage.

7/ Appreciably less jitter than 0.005 μs can be realized using an anode voltage of 8 kv or more, a grid drive amplitude near the maximum and a grid drive impedance near the minimum values.

8/ There shall be no pronounced resonance in the range from 0 to 2,000 pps.

9/ The circuit constants shall be so chosen, that at epy = 16 kv under resonant charging conditions; dik/dt = 1,500 a/μs (min); ib = 175 a (min); tp = 1.0 ± 10 percent μs; prr = 1,000 (min). The grid pulse characteristics shall be: tp = 2.0 μs (max); tr = 0.35 μs (min); and Zs = 500 ohms (min).

10/ The tube shall operate satisfactorily on push-button starting within three attempts when the anode voltage (epy) is applied to the tube under test (TUT) in such a manner as to rise from 0 to 16 kv minimum within .03 second. (The filter in the rectifier shall be so designed that the epy reaches at least 7 kv within .015 second.) Any tube failing to start within three attempts will be considered a failure.

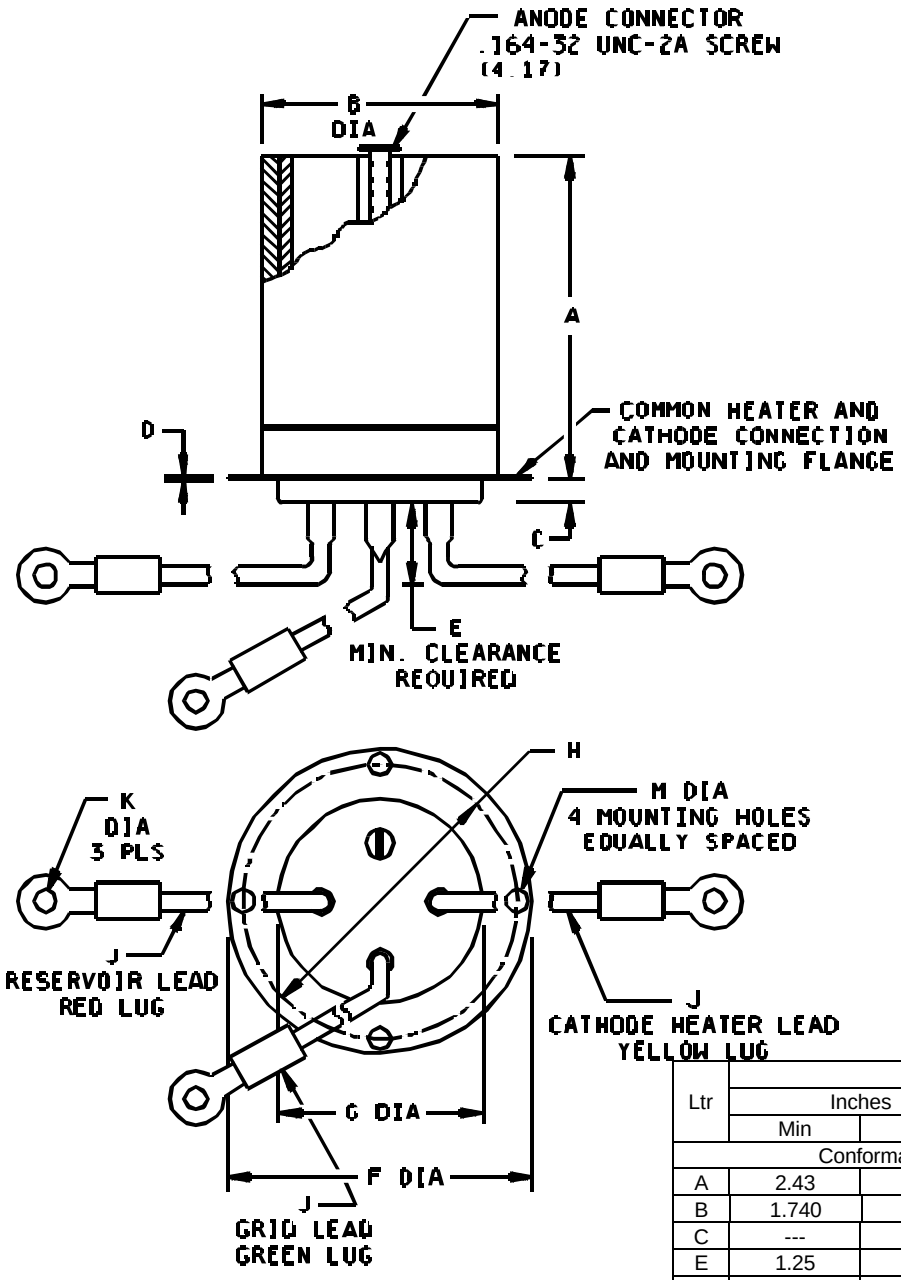
11/ This test shall be performed simultaneously with the operation (1) test. An anode delay time measurement shall be made at the end of 2 and at the end of 10 minutes of that test. The change in anode delay time (with respect to the 2 minute reading) shall not exceed the specified value.

12/ The tube shall be tested by applying a peak forward anode voltage not to exceed the value specified in the test conditions for the time jitter test immediately after the cathode warmup period (tk). After 60 seconds of operation, the variation in firing time (tj), measured at 50 percent of the cathode current pulse, shall be not greater than the amount specified.

13/ The circuit constants shall be so chosen that under resonant charging conditions at epy = 6.0 kv; ib = 12.0 a minimum; dik/dt = 150 a/μs minimum; tp = 66 μs ± 10 percent; prr = 400; inverse voltage due to mismatch = 10 percent epy. The grid pulse characteristics shall be: tp = 2.0 μs (max); tr = 0.35 μs (min); internal driver impedance 500 ohms (min).

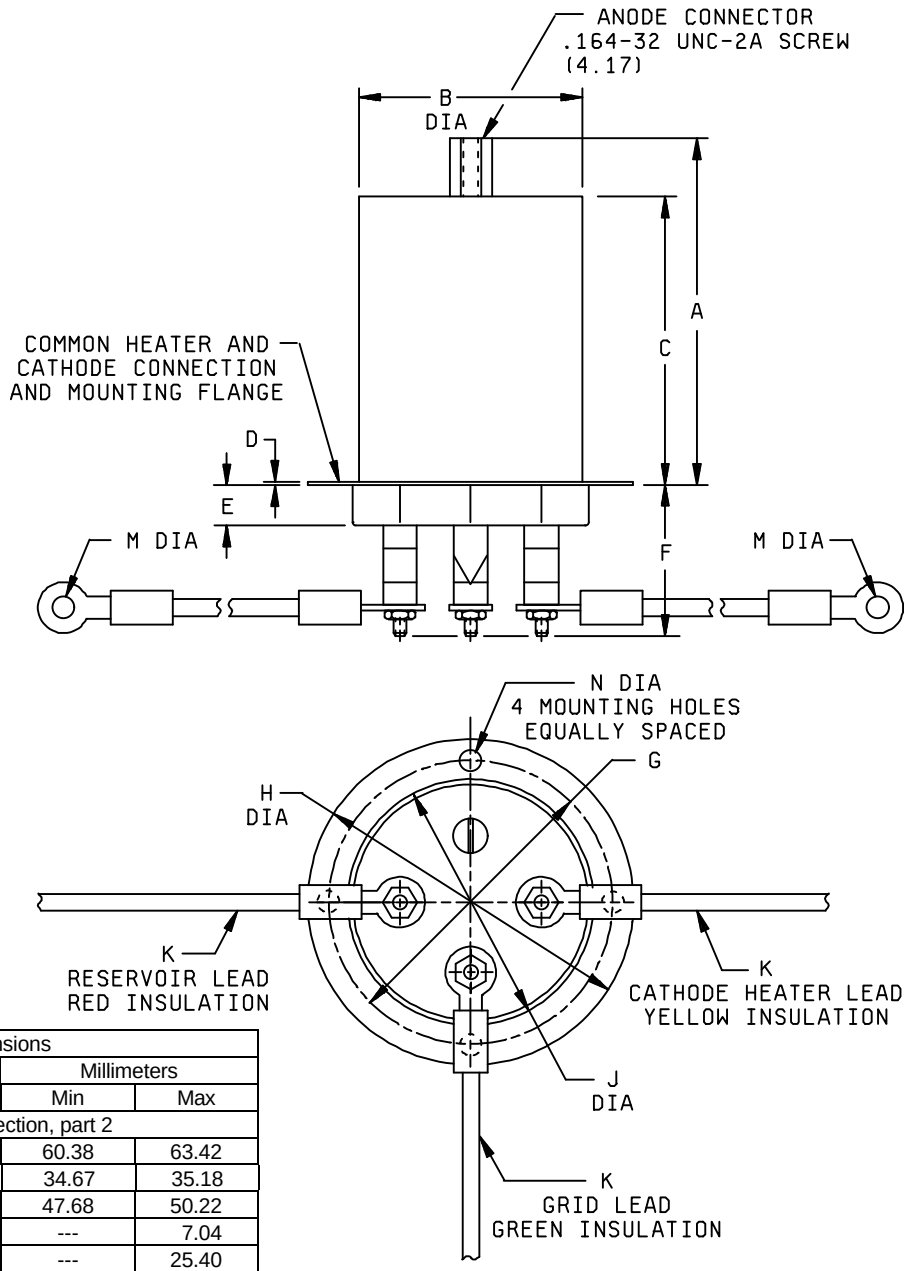
14/ This test shall be conducted for a total of 5 hours with no more than three kickouts. The tube shall be started with 107.5 percent Eres and operate at this value for 4 hours. At the start of the fifth hour, and while the tube is still operating, the voltage shall be lowered to Eres = 92-1/2 percent and remain there for the final one hour of operation.

15/ This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. A test sample of three tubes shall be used with an acceptance number of zero. In the event of failure the test will be made as a part of conformance inspection, part 2, code level D, with an acceptance level of 6.5. The regular "12-calendar month" sampling plan shall be reinstated after three consecutive samples have been accepted.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	2.43	2.47	61.72	62.74
B	1.740	1.760	44.20	44.70
C	---	.28	---	7.11
E	1.25	---	31.75	---
F	2.245	2.255	57.02	57.28
G	---	1.50	---	38.10
Reference dimensions				
D	.030		0.76	
H	2.031		51.59	
J	6.00		152.40	
K	.203		5.16	
M	.147		3.73	

FIGURE 1. Outline drawing of electron tube type 7665.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	2.377	2.497	60.38	63.42
B	1.365	1.385	34.67	35.18
C	1.877	1.997	47.68	50.22
E	---	.279	---	7.04
F	---	1.00	---	25.40
H	---	2.250	---	57.15
J	---	1.50	---	38.10
Reference dimensions				
D	.030		0.76	
G	2.031		51.59	
K	6.00		152.40	
M	.203		5.16	
N	.147		3.73	

FIGURE 1A. Outline drawing of tube type 7665A.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Review activities:
Army - AR, MI
Navy - AS, CG, OS, SH
Air Force - 99

Preparing activity:
DLA - CC

(Project 5960-3510)